Claims:

1. A photoacoustic detector, comprising at least
- a first chamber (V_0) suppliable with a gas to be analyzed,
- a window for letting modulated and/or pulsed infrared radiation and/or light in the first chamber (V_0),
- a second chamber (V), which constitutes a measuring space with a volume V and which is in communication with the first chamber by way of an aperture provided in a wall of the first chamber,
- at least one sensor, which is arranged in the wall aperture of the first chamber and adapted to be movable in response to pressure variations produced in the first chamber by absorbed infrared radiation and/or light, and
- means for measuring the sensor movement, **characterized** in that the means for measuring the sensor movement include at least one or more light sources for illuminating the sensor or a part thereof and one or more multi-detector detectors for the reception of light reflected from the sensor and for measuring the sensor movement as optical angular and/or translatory measurement.

2. A photoacoustic detector as set forth in claim 1, **characterized** in that the light source comprises a laser or a filament.

3. A photoacoustic detector as set forth in claim 1 or 2, **characterized** in that the focus of a light beam emitted by the light source is arranged approximately on a sensor surface.

4. A photoacoustic detector as set forth in claim 1 or 2, **characterized** in that the focus of a light beam emitted by the light source is arranged approximately on a double detector.

5. A photoacoustic detector as set forth in claim 1, **characterized** in that the means for measuring the sensor movement include at least a laser or a filament functioning as a light source, at least one optical lens for focusing the laser beam, a reference mirror, a beam splitter for splitting the laser beam for the sensor and the reference mirror, and a triple or array detector, functioning as the detector, for receiving the laser beams coming from the beam splitter.

6. A photoacoustic detector as set forth in claim 5, **characterized** in that the reference mirror is arranged in such a way that the triple or array detector develops 3/4 of the interference fringe.

7. A photoacoustic detector as set forth in claim 5 or 6, **characterized** in that the means for measuring the sensor movement further include a fixed plane mirror and a fixed end mirror, arranged in such a manner that the laser light travels to the end mirror and back, reflecting reciprocally between the sensor and the plane mirror.

8. A photoacoustic detector as set forth in claim 7, **characterized** in that the plane mirror and/or the end mirror are arranged in such a way that the laser beam, adapted to travel from the beam splitter by way of the sensor to the end mirror, returns over the same optical path from the end mirror back to the beam splitter.

9. A photoacoustic detector as set forth in any of the preceding claims, **characterized** in that it further comprises a third chamber, which is closed and identical to the first chamber in terms of size and has an aperture which is identical to that included in the first chamber and connects the third chamber with the second chamber, and said aperture of the third chamber being closed with a sensor similar to that closing the aperture of the first chamber, and the movement of said sensor being measured in a manner similar to that used for measuring the movement of a sensor closing the first chamber aperture, as well as means for calculating the amplitudes of an actual measuring signal measured from the sensor fitted in the first chamber aperture and a reference signal measured from the sensor fitted in the third chamber aperture, and for working out a difference therebetween.

10. A measuring system in a photoacoustic detector for measuring the movement of a sensor in a photoacoustic detector, **characterized** in that it comprises at least a laser or a filament functioning as a light source, at least one optical lens for focusing a light beam, a reference mirror, a beam splitter for splitting the light beam for the sensor and the reference mirror, a fixed plane mirror and a fixed end mirror, which are arranged such a manner that the light beam travels to the end mirror and back, reflecting reciprocally between the sensor and the plane mirror, and a triple or array detector, functioning as the detector, for receiving the light beams coming from the beam splitter.

11. A method for measuring the movement of a sensor in a photoacoustic detector, **characterized** in that the measurement is implemented as an optical measurement,

the sensor or a part thereof being illuminated and light reflected from the sensor being measured by means of a multi-detector detector, and

- the sensor movement is measured as angular measurement by concentrating the focus of a light beam approximately on a double detector and by measuring the displacement of a reflected light beam by means of a double detector or an array detector, or
- the sensor movement is measured as translatory measurement by concentrating the focus of a light beam approximately on the sensor surface and on a double or array detector and by measuring the displacement of a reflected light beam by means of a double or array detector or
- the sensor movement is measured as translatory measurement by using an interferometer and by measuring the displacement of the interference fringe of a light beam reflected from the sensor by means of a triple or array detector.

12. A method in the optimization of a photoacoustic detector, **characterized** in that the optimization regarding the amplitude of a sensor adapted to be movable in response to pressure variations is implemented by applying the optimization equation:

$$A_x(\omega) \approx \frac{p_0 \Delta T / T_0}{\rho d \omega_0^2 + \frac{p_0 A}{2V_0}}, \qquad \text{when } \omega < \omega_0$$

$$A_x(\omega) \approx \frac{p_0 \Delta T / T_0}{\rho d \omega^2 + \frac{p_0 A}{2V_0}}, \qquad \text{when } \omega > \omega_0$$

13. A method as set forth in claim 12, **characterized** in that optimization of the amplitude $A_x(\omega)$ is effected by optimizing at least one of the following variables: ω_0, A, d and V_0.